

# **The Effect of Bonus Schemes and Media Richness on Virtual Team Building**

By

Stephanie M. Bryant, Ph.D.\*  
Dan R. and Tina P. Johnson Distinguished Professor  
University of South Florida  
[sbryant@coba.usf.edu](mailto:sbryant@coba.usf.edu)  
telephone: (813) 974-6550  
fax: (813) 974-6528

Susan Albring, Ph.D.  
Assistant Professor  
Syracuse University  
[salbring@coba.usf.edu](mailto:salbring@coba.usf.edu)  
telephone: (813) 298-6968  
fax: (same)

Uday Murthy, Ph.D.  
Quinn Eminent Scholar  
University of South Florida  
[umurthy@coba.usf.edu](mailto:umurthy@coba.usf.edu)  
telephone: (813) 974-6523  
fax: (same)

\*Corresponding Author

# **The Effect of Bonus Schemes and Media Richness on Virtual Team Building**

## **ABSTRACT**

This study explores the dynamics of virtual teams. We hypothesize that team member satisfaction, team cohesion and sociometric structure increase with the use of bonus schemes in a virtual team environment. We also hypothesize that team member satisfaction, team cohesion and sociometric structure increase with the use of a richer technology medium in a virtual team environment. Using eighty-nine MBA students at a large southeastern university as participant's for our study, we find that sociometric structure increases with the use of bonus schemes in a virtual team environment. We also find that sociometric structure increases with the use of a richer technology medium in a virtual team environment.

**Keywords:** virtual teams; team member satisfaction; team cohesiveness; sociometric structure; informal leadership; social loafing.

**Data availability:** Data are available from the authors upon request.

## I. INTRODUCTION

An increasingly global world means that more employees are working in virtual teams. Although there is a significant body of work on face-to-face team dynamics, there is little work in the dynamics of virtual teams. We advance the study of virtual teams by focusing “on understanding the functioning of virtual teams rather than on simply comparing them to face-to-face teams” and examining “how the extent of virtualness affects virtual team functioning” (Martins et al. 2004).

Our goal is to study two environmental level input factors, the reward structure and technology medium richness to observe the impact on team process and interaction. Specifically, we are interested in whether a reward structure that increases internal locus of control (Rotter 1966) will increase team interaction and reduce social loafing, which occurs when individuals do not “pull their weight” on a team project.<sup>1</sup> Additionally, media richness theory (Daft and Lengel 1986) suggests that a richer technology medium will promote social presence, which should theoretically reduce social loafing and increase interaction among team members.

Recent literature proxies for social loafing with 3 variables; recall ability, self-reported effort and participation (Blaskovich 2008). Results suggest participants in a virtual team environment put forth less effort as compared to face-to-face teams, suggesting that social loafing is higher in virtual teams than in face-to-face teams. Prior literature also finds that team members generated more ideas when they were collocated rather than distributed (Chidambaram and Tung 2005)). Blaskovich (2008) uses recency bias as a proxy for group performance and finds that recency bias is evident in virtual

---

<sup>1</sup> Note to Stephanie & Susan -see [http://wik.ed.uiuc.edu/index.php/Locus\\_of\\_control](http://wik.ed.uiuc.edu/index.php/Locus_of_control) for discussion of locus of control

group decisions, suggesting that performance of virtual teams was not as strong as performance for teams meeting face-to-face. Chidambaram and Tung (2005) did not find that quality of final team decision differed for collocated versus distributed teams. The present study investigates methods to reduce social loafing. Specifically we hypothesize that team member satisfaction, team cohesion and sociometric structure increase with the use of bonus schemes in a virtual team environment. We also hypothesize that team member satisfaction, team cohesion and sociometric structure increase with the use of technology medium richness in a virtual team environment.

Eighty-nine MBA students at a large southeastern university participated in the study. Students completed three written projects with their team members. The two independent variables were bonus scheme (bonus or no bonus) and the technology medium (rich or less rich). Using factor analysis with a varimax rotation, four dimensions were created representing the dependent measures; a measure of team member satisfaction, two measures of team cohesiveness and a measure of sociometric structure.

We find that sociometric structure increases with the use of bonus schemes in a virtual team environment. We also find that sociometric structure increases with the use of a richer technology medium in a virtual team environment. Sociometric structure is measured by participant's responses to three questions concerning informal leadership (Green and Taber 1980) and social loafing.<sup>2</sup> The two questions on social loafing are original to our study. The questions on social loafing address whether team members shared the work load and contributed evenly to the success of the project and whether all team members have the same level of work ethic.

---

<sup>2</sup> We are measuring one sociometric measure, there are multiple sociometric measures.

The remainder of the paper is organized in five sections. In the second section, we discuss background and develop the hypotheses and in the third section, we discuss the participant's, task and experimental design. In the fourth section, we present the statistical analyses and in the fifth section we discuss the results. Finally, in the last section we discuss conclusions and limitations of the study and offer suggestions for future research.

## **II. BACKGROUND AND HYPOTHESES**

Definitions of virtual teams used in recent literature suggest that virtual teams are “teams first and that virtualness is treated as a team characteristic, while also incorporating the traditional components of virtual teams” (Martins et al. 2004, 808). Consistent with Martins et al. (2004), we define virtual teams as “teams whose members use technology to varying degrees in working across locational, temporal, and relational boundaries to accomplish an interdependent task.” We organize our discussion of the hypotheses using the McGrath (1964) model (hereafter, the McGrath model) of input, process, and output stages of group effectiveness (Bryant and Albring 2006). See Figure 1.

We examine two environmental-level factors in McGrath's input stage of group effectiveness; reward structure and technology. Prior research compares face to face teams using Group Decision Support Systems (GDSS) to distributed teams using GDSS and examined rewarding team members based on individual decision outcome or on team decision outcome (Barkhi et al. 2004). Results suggest performance of face-to-face teams is better than distributed teams when the incentive is team based. Findings also suggest that the difference between the performance of face-to-face and distributed teams is less with individual-based than with team-based incentive structure.

Most prior research on the effects of computer mediated communication has compared teams meeting face-to-face to teams using asynchronous computer mediated communication. A paucity of recent work has examined the effects of the level of virtuality in team settings. Murthy and Kerr (2004) examined three communication types; face-to-face, bulletin-board tool, and a chat tool. Findings suggest that teams using the bulletin-board tool performed better than teams using the chat tool and teams communicating face-to-face. Rico and Cohen (2005) examined the effects of task interdependence and level of communications synchrony on performance in a virtual team setting. The authors find high values of virtual team performance in conditions of “low task interdependence” and “asynchrony of communication” and in conditions of “high task interdependence” and “synchrony of communication.” Results also suggest that teams using synchronous communication performed better overall than teams using asynchronous communication.

#### A. Review of the Literature

Table of studies reviewed

#### B. Hypotheses

##### **Bonus Schemes**

We examine whether team member satisfaction, team cohesiveness, and sociometric structure increases with the use of bonus schemes in a virtual team environment. Gil et al. (2005) find that the relationship between change-oriented leadership and team satisfaction is mediated by the global climate and the climate of innovation. Piccoli et al. (2004) find that satisfaction increases as coordination (communication) effectiveness increases.

Members of cohesive teams have less anxiety and less variation in productivity, cohesive teams productivity differs more (higher or lower) depending on perceived

support of company, team cohesiveness is positively related to the degree of prestige members associate with their own jobs and to opportunity for interaction (Seashore 1954, 98-99). Martins et al. (2004, 822) suggest that more research is needed on team cohesiveness in virtual teams because team cohesion may help virtual teams to overcome difficulties typically encountered in virtual interaction. Recent research, finds that team cohesiveness and social loafing behavior were lower in fluid teams than in stable teams (Dineen 2005). Chidambaram and Tung (2005) find that a group's degree of cohesiveness will be inversely related to size. The authors do not find that a group's degree of cohesiveness differs for collocated versus distributed teams.

H1a: Team member satisfaction increases with the use of bonus schemes in a virtual team environment.

H1b: Team cohesiveness increases with the use of bonus schemes in a virtual team environment.

H1c: Sociometric structure increases with the use of bonus schemes in a virtual team environment.

### **Technology Medium**

Caballer et al. (2005) find that satisfaction with team process when teams perform intellectual tasks is higher in teams using video-conferencing than in those using face-to-face or computer mediated communication. Chidambaram et al. (1990-1991) find that group support system teams became more cohesive over time as compared to non-group support system teams. Using electronic brainstorming teams, Shepherd et al. (1996) find that social comparisons enabled by electronic graphs representing an imaginary "average" group decreased the effects of social loafing.

H2a: Team member satisfaction increases with the use of a richer technology medium in a virtual team environment.

H2b: Team cohesiveness increases with the use of a richer technology medium in a virtual team environment.

H2c: Sociometric structure increases with the use of a richer technology medium in a virtual team environment.

### **III. METHOD**

#### **Participants and Task**

Eighty-nine MBA students at a large southeastern university participated in the study. Students completed three written projects with their team. Teams were randomly assigned by the instructor, controlling for culture to the extent possible given the overall diversity of the class. Each team consisted of between three and five students.<sup>3</sup>

Participants were divided into two conditions; blackboard and Go To Meeting software. Separate, brief training sessions were conducted for participants using blackboard and participants using Go To Meeting software. Participants were also divided into bonus, no bonus conditions.

Three separate projects were conducted over a three-week period. Teams stayed the same (except for attrition) during this time. Project one required participants to analyze financial statements for two companies to guide a buy/sell recommendation. Project two required participants to analyze financial statements for one company to determine whether or not a loan should be made. The final project required participants to analyze financial statements and determine whether an acquisition should be made. The written team projects were completed outside of class and were due one at a time each week over a three week period. The students were randomly assigned to one of the four experimental conditions.

---

<sup>3</sup> Teams originally consisted of between four and five members. Three teams consisted of three students because students from the original team dropped the course. Almost all experiments examining virtual teams that use student participants have ranged in size from 3 to 5 members (Martins et al. 2004).

Each project involved three major tasks. Task one is assessing the solvency position of the firm(s). Task two is assessing the earnings power and persistence of the firm(s). Task three is assessing the earnings quality of the firm(s). Teams were required to prepare a report from your team, maximum length of 4 typed, double-spaced pages including: 1) ratings of the three dimensions and support for your ratings (ratio calculations and qualitative discussion) 2) a memo stating why the ratings on these three dimensions do (or do not) differ between the two companies; 3) and a signed honor code.<sup>4</sup> A team grade was assigned by the instructor based on a set of guidelines. The three projects were worth approximately 16 percent of their total grade which provided strong incentive for teams to work hard to produce a high-quality team project.

**Experimental Design**

To test the hypotheses, we use a 2 X 2 between subjects experiment. We perform an ANCOVA.

**Independent Variables**

The two independent variables were bonus scheme (bonus or no bonus) and the technology medium (rich or less rich). Participants in the bonus scheme condition allocated a total of 3 bonus points times the number of team members. For a team consisting of 4 members, each participant allocated a total of 12 bonus points.

Participant’s indicated any number of points for an individual from 0-12. For example, the following peer evaluations from a team are as follows:

Team Member	Results of peer evaluations				
	Tom	Susie	Sally	John	Total

<sup>4</sup> The honor code required team members to certify that they did not communicate with team members face-to-face and that they used the assigned software to communicate with their team. Team members also certified that they did not receive help from any unauthorized source, including people inside and outside the class.

Tom	3	3	3	3	12
Susie	0	4.5	4.5	3	12
Sally	1.5	4.5	3	3	12
John	3	3	1.5	4.5	12
Average	1.875	3.75	3	3.375	12

In this scenario, Tom would receive 1.875/3 points, Susie would receive 3.75/3 points (in effect, extra credit); Sally would receive 3 points; and John would receive 3.375 points.

Participants in the no bonus scheme condition did not allocate bonus points to themselves or their team members.

Participants in the rich technology medium condition were required to use Go to Meeting software. Go to Meeting software allows simultaneous file sharing and telephone communication during on-line meetings. Participants in the less rich technology medium condition were required to use Blackboard. Blackboard participants are able to share files but not simultaneously. Blackboard participants were not allowed to use the telephone as a form of communication to complete team projects. We control for appropriate use of telephone communication for each condition. Question 42 responses indicate that participants used the technology as intended; used the telephone during on-line meetings with Go to Meeting software, did not use the telephone as a method of communication with blackboard.

### **Dependent Measures**

All items were assessed using Likert scales. A complete listing of the specific items used is included in Appendix A. Using factor analysis with a varimax rotation, four dimensions were created representing the dependent measures; team member satisfaction, two measures of team cohesiveness and a measure of sociometric structure. Caballer et al. (2005) measure process satisfaction on a five-point scale using three items adapted from McGrath (1993), including; “how comfortable does the group feel working

together?”, “...do you feel free enough to express disagreements?”, “...were you prepared to learn from others?”. Gil et al. (2005) measure team satisfaction using Gladstein’s (1984) scale of three items. The scale indicates the degree to which subjects display satisfaction with their colleagues, the manner of team working and with the team as a whole on a five-point Likert scale.

Piccoli et al. (2004) measure satisfaction as adapted from Pinto et al.’s (1993) validated scale used in research on collocated cross-functional team research. Four items are included in the measure; enjoyed working with virtual team members, members contributed fair share, enjoyed working on the team project, would enjoy working with virtual team members again.” The five items used to assess team member satisfaction in our study were those given by Andres (2002 and 2006) as adapted from Green and Taber (1980) to measure team process. The questions asked “how would you describe your team process?” on five-point Likert scales for “fair, confusing, satisfying, efficient, and coordinated”. Refer to Appendix A, Part II, questions 4 through 8. Each participant’s summed responses to each of the five questions were calculated and are used as the dependent measure in tests of H1a and H2a.

Seashore (1954, 97) measures team cohesiveness as “attraction of members to the group in terms of the strength of forces on the individual member to remain in the group and to resist leaving the group.” Dineen (2005) measures cohesiveness based on Seashore (1954) and measures social-loafing by calculating the standard deviation among peer ratings made by each team member for each of 8 weeks. In our study, team cohesiveness is measured by participants’ responses to seven questions as given by Huang et al. (2003) as adapted from Larson and LaFasto (1989) to measure team commitment and collaborative climate on a four-point Likert scale. Refer to Appendix

A, Part II, questions 22 through 28. Each participant's summed response to the seven questions are used as the dependent measure in tests of H2a and H2b. In addition, three questions measure team cohesion as given by Huang et al. (2003) as adapted from Seashore (1954) measure team cohesiveness. Using a five-point Likert scale, these questions ask "how does your work team compare with other student teams?" in terms of "the way people get along together", "the way people work together", "the way people help each other". Refer to Appendix A, Part 5, questions 15-17. Each participant's summed response to the three questions are used as alternative dependent measure of team cohesiveness in tests of H1b and H2b.

In our study, sociometric structure is measured by participant's responses to three questions concerning informal leadership (Green and Taber 1980) and social loafing. Measured on a seven-point Likert scale, the question on informal leadership asks "to what extent did you feel one person influenced the final solution more than the rest of the group?" The two questions on social loafing are original to our study. The questions on social loafing ask whether team members shared the work load and contributed evenly to the success of the project and whether all team members have the same level of work ethic. Refer to Appendix A, Part II, questions 38-40 for questions on one measure of sociometric structure. The z-score of each participant's summed response to the three questions was calculated to form corresponding scales. The z-scores to each of the three questions are used as the dependent measure in tests of H1c and H2c.

## **IV. RESULTS**

### **Manipulation Check and Measure Reliability**

Several questions included in the questionnaire were designed to measure whether participants understood various aspects of the experimental conditions. Questions 42, 43, 46 and 49 are included in Appendix A, part X. The responses to questions 43 and 46

indicate that participants used the technology medium (blackboard or Go to Meeting) they were assigned. The responses to question 42 indicate that participants used the technology as intended (used the telephone during on-line meetings with Go to Meeting software, did not use the telephone as a method of communication with blackboard). Question 49 was designed to measure the effect of peer-determined bonus points on individual effort and is scaled from 1 (to a little extent) to 7 (to a very great extent) on a Likert scale. The mean summed responses indicate that the effect of peer-determined bonus points had some effect on individual effort (mean = 4.59). Thus, the manipulations were successful.

Cronbach's alpha was used to assess the reliability of questions measuring constructs; team member satisfaction, team cohesiveness, sociometric structure. Cronbach's alpha for team member satisfaction, team cohesiveness and sociometric structure were .802, .902, and .684, respectively. Hence, these three constructs satisfied Nunnally's (1978) criteria for reliability.

### **Sample Characteristics and Control Variables**

The majority of participants in the study were male (64 percent). Thirty-six percent of participants are 21-25 years of age, thirty-nine percent are 26-30 years of age, 16% are 31-35 years of age, and the remaining 9% are above 35 years of age. The majority of participant's have more than 3 years of work experience (63%), while 25% have 1-3 years of work experience and 12% have no work experience. Eighty-one percent of participant's have a bachelor's degree, sixteen percent have a Master's degree and 2% have a doctorate degree in a field other than accounting. One percent of participant's have a bachelor's degree in accounting. Size of teams ranged from three to five members. The mean summed responses for participant's indicate that the overall

undergraduate GPA was 3.29<sup>5</sup>. Participant's were asked how comfortable they feel using computer technology on a Likert scale ranging from 1 (very comfortable) to 5 (very uncomfortable). The mean summed responses indicate that participant's were comfortable using computer technology (mean=2.63).

In this study, we examined bivariate correlations for possible control variables including; age, full-time work experience, gender, formal education, size of team, undergraduate GPA, comfort in using computers and experience with collaborative software. Lind (1999) find that women in virtual teams, as compared to men, were more satisfied, felt their teams were more inclusive, supportive and stuck together more often and that team conflict was resolved quickly. Savicki et al. (1996) find that female only teams, as compared to male only and mixed gender teams, were more satisfied and perceived higher levels of team development. Consistent with prior literature, bivariate correlations reveal that gender should be included in the ANCOVA.

### **Tests of Hypotheses**

Hypothesis 1a predicts that team member satisfaction increases with the use of bonus schemes in a virtual team environment. Table 1, Panel B suggests that for the bonus and no bonus conditions, team member satisfaction is statistically different, however the overall model is not significant. Hypothesis 1b predicts that team cohesiveness increases with the use of bonus schemes in a virtual team environment. Table 2, Panel B suggests that team cohesiveness is not statistically different between the bonus and no bonus conditions. Hypothesis 1c predicts that sociometric structure increases with the use of bonus schemes in a virtual team environment. Consistent with

---

<sup>5</sup> Five participant's did not respond to this question.

H1c, Table 3, Panel B provides the ANCOVA results, which indicate a significant main effect for bonus ( $F = 11.21, p = .001$ ).<sup>6</sup> Thus, presence of a bonus scheme increases sociometric structure; including informal leadership and social loafing.

Hypothesis 2a predicts that team member satisfaction increases with the use of a richer technology medium in a virtual team environment. Table 1, Panel B suggests that team member satisfaction is not statistically different between a richer technology medium and a less rich technology medium. Hypothesis 2b predicts that team cohesiveness increases with the use of a richer technology medium in a virtual team environment. Table 2, Panel B suggests that team cohesiveness is not statistically different between a richer technology medium and a less rich technology medium. Hypothesis 2c predicts that sociometric structure increases with the use of a richer technology medium in a virtual team environment. Consistent with H2c, Table 3, Panel B indicates a significant main effect for technology medium ( $F = 2.999, p = .04$ ). In addition, the model is highly significant ( $F = 6.56, p = .00$ ) and the adjusted r-square is .20. Thus our results suggest that presence of a richer technology medium increases sociometric structure.

## **V. DISCUSSION**

Prior research finds that participants in a virtual team environment put forth less effort as compared to face-to-face teams, suggesting that social loafing is higher in virtual teams than in face-to-face teams (Blaskovich 2008). Our paper investigates methods to reduce social loafing. One significant contribution of this study is the finding that sociometric structure increases with the use of a richer technology medium in a virtual team environment. A second contribution of our study is that sociometric structure increases with the use of bonus schemes in a virtual team environment.

---

<sup>6</sup> p-values are reported using a one-tailed test.

## **VI. SUMMARY AND CONCLUSION**

This study contributes to the literature on the dynamics of virtual teams by improving our understanding of the role of technology medium and bonus schemes in a virtual team environment. The findings show that sociometric structure increases with the use of bonus schemes in a virtual team environment. We also find that sociometric structure increases with the use of a richer technology medium in a virtual team environment. Our measures of sociometric structure includes informal leadership (Green and Taber 1980) and two measures of social loafing that are original to our study.

Our study does have limitations. The results of the study are based on a sample of MBA students. Although the members were randomly assigned to teams, the population was limited to MBA students, and thus, may not reflect all potential members of a virtual team. In addition, in the bonus condition, bonus points were allocated based on perceived performance of team members. The results in our study may not generalize to situations where team members are given information about the actual performance of each team member. Similarly, this paper does not examine a bonus scheme based on team performance.

Future research exploring team member satisfaction, team member cohesiveness and sociometric structure could use a different type of task. The task used in our study was a decision task (or is it a problem task-Stephanie?), a task that requires finding a solution that best satisfies multiple outcomes. To maximize task/technology fit, the technology should include a low communication support dimension, high process structuring dimension and high information processing dimension (Zigurs and Buckland, 1998). It is possible that the communication support provided by blackboard and Go to Meeting has the potential to create communication overload for this task.

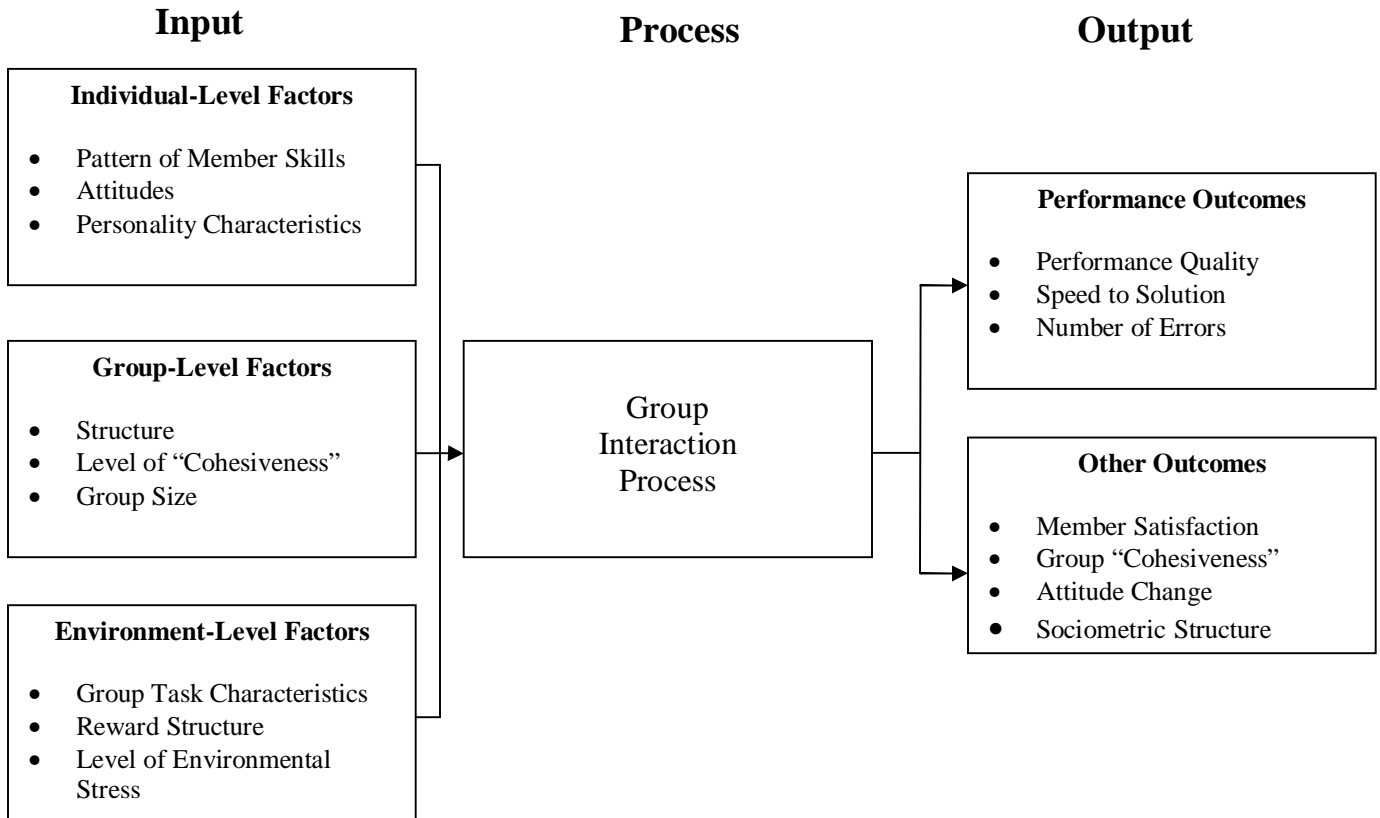
Another potential limitation of our paper is the time period over which our study was conducted. One project was due each week for 3 weeks. “Virtual teams at early stages of team development may require richer media for socialization and trust-building processes, whereas established teams may communicate using less rich media“ (Maruping and Agarwal 2004). It is possible that blackboard is not a rich enough media to develop socialization and trust-building over a relatively short time period.

## REFERENCES

- Andres, H. 2002. A comparison of face-to-face and virtual software development teams. *Team Performance Management* (8:1/2): 39-48.
- Andres, H. 2006. The impact of communication medium on virtual team group process. *Information Resource Management Journal* (19:2): 1-17.
- Blaskovich, J. 2008. Exploring the effect of distance: An experimental investigation of virtual collaboration, social loafing, and group decisions. *Journal of Information Systems* (22:1): 27-46.
- Bryant, S. and S. Albring. 2006. Effective team building: Guidance for accounting educators. *Issues in Accounting Education* (August): 241-265.
- Caballer, A., F. Gracia, and J. Peiro. 2005. Affective responses to work process and outcomes in virtual teams. *Journal of Managerial Psychology* (20: ¾): 245-260.
- Chidambaram, L., R. Bostrom, B. Wynne. 1990-1991. A study of the impact of group decision support systems on group development. *Journal of Management Information Systems* (7:3), 7-25.
- Chidambaram, L. and L. Tung. 2005. Is out of sight, out of mind? An empirical study of social loafing in technology-supported groups. *Information Systems Research* (16:2), 149-168.
- Daft, R., and R. Lengel. 1986. Organizational information requirements, media richness and structural design. *Management Science* (32): 554-571.
- Dineen, B. 2005. TeamXchange: A team project experience involving virtual teams and fluid team membership. *Journal of Management Education* (29:4): 593-616.
- Gil, F., R. Rico, C. Alcover and A. Barrasa. 2005. Change-oriented leadership, satisfaction and performance in work groups. *Journal of Managerial Psychology* (20:¾): 312-328.
- Gladstein, D. 1984. Groups in context: a model of task group effectiveness. *Administrative Science Quarterly* (29): 499-517.
- Green, S.G. and T.D. Taber. 1980. The effects of social decision schemes on decision group process. *Organizational Behavior and Human Decision Processes* (25:1): 97-106.
- Huang, W.W., W. Kwok-Kee, R.T. Watson, and B.C.Y. Tan, 2003. Supporting virtual team-building with a GSS: an empirical investigation. *Decision Support Systems* (March): 359-367.

- Jex, S. 2002. *Organizational Psychology: A Scientific-Practitioner Approach*. New York, NY: John Wiley & Sons, Inc.
- Larson, C.,E, and F.M.J. LaFasto. 1989. *Teamwork: What Must Go Right/What Can Go Wrong*, New York, NY: Sage Publications.
- Lind, M. R. 1999. The gender impact of temporary virtual work groups. *IEEE Transactions on Professional Communication*, 42: 276-285.
- McGrath, J. 1964. *Social Psychology: A Brief Introduction*. New York, NY: Holt.
- McGrath, J. 1993. Introduction: the JEMCO workshop – description of a longitudinal study. *Small Group Research*, 24: 285-306.
- Maruping, L. and R. Agarwal. 2004. Managing Team Interpersonal Processes Through Technology: A Task-Technology Fit Perspective. *Journal of Applied Psychology*, 6: 975-990.
- Murthy, U. and D. Kerr. Comparing audit team effectiveness via alternative modes of computer-mediated communication. *Auditing: A Journal of Practice and Theory*, 23:141-152.
- Nunnally, J. *Psychometric Theory*. McGraw-Hill, New York, NY 1978.
- Piccoli, G., A. Powell, B. Ives. 2004. Virtual teams, team control structure, work process, and team effectiveness. *Information Technology and People*, 17: 359-379.
- Pinto, M., J. Pinto, and J. Prescott. Antecedents and consequences of project team cross-functional cooperation. *Management Science*, 39: 1281-97.
- Rico, R. and S. Cohen. 2005. Effects of task interdependence and type of communication on performance in virtual teams. *Journal of Managerial Psychology*, 20: ¾: 261-274.
- Savicki, V., M. Kelley, and D. Lingenfelter. 1996. Gender, group comparison, and task type in small task groups using computer-mediated communication. *Computers in Human Behavior*, 12: 549-565.
- Seashore, S. 1954. *Group Cohesiveness in the Industrial Work Group*. Ann Arbor: University of Michigan Press.
- Shepherd, M., M. Briggs, R. Reinig, B. Yen, and J. Nunamaker. 1996. Invoking social comparison to improve electronic brainstorming: Beyond anonymity. *Journal of Management Information Systems*, 12: 155-170.
- Zigurs, I. and B. Buckland. 1998. A theory of task/technology fit and group support systems effectiveness. *MIS Quarterly*, 22: 313-334.

**FIGURE 1**  
**MCGRATH'S MODEL OF GROUP EFFECTIVENESS**



(Source: Jex 2002, 126)

**TABLE 1**  
**Univariate Analysis of Variance**  
**Dependent Variable-Team Member Satisfaction**

**Panel A**

**Between-Subjects Factors**

		Value Label	N
Bonus	0		48
	1		41
Technology	1	Go to Meeting	46
	2	Blackboard	43

**Panel B**

**Tests of Between-Subjects Effects**

Dependent Variable: Satisfaction

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2.890 <sup>a</sup>	4	.723	1.323	.268
Intercept	.280	1	.280	.512	.476
@13	.269	1	.269	.492	.485
Bonus	2.077	1	2.077	3.801	.055
Technology	.000	1	.000	.000	.984
Bonus * Technology	.556	1	.556	1.018	.316
Error	45.888	84	.546		
Total	48.779	89			
Corrected Total	48.779	88			

a. R Squared = .059 (Adjusted R Squared = .014)

**TABLE 2**  
**Univariate Analysis of Variance**  
**Dependent Variable- Team Cohesiveness**

**Panel A**

**Between-Subjects Factors**

		Value Label	N
Bonus	0		48
	1		41
Technology	1	Go to Meeting	46
	2	Blackboard	43

**Panel B**

**Tests of Between-Subjects Effects**

Dependent Variable: Cohesive1

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.849 <sup>a</sup>	4	.462	.718	.582
Intercept	.140	1	.140	.218	.642
@13	.149	1	.149	.232	.631
Bonus	.152	1	.152	.236	.628
Technology	.185	1	.185	.287	.593
Bonus * Technology	1.450	1	1.450	2.253	.137
Error	54.068	84	.644		
Total	55.917	89			
Corrected Total	55.917	88			

a. R Squared = .033 (Adjusted R Squared = -.013)

**TABLE 3**  
**Univariate Analysis of Variance**  
**Dependent Variable-Team Cohesivness**

		Value Label	N
Bonus	0		47
	1		41
Technology	1	Go to Meeting	46
	2	Blackboard	42

**Tests of Between-Subjects Effects**

Dependent Variable: Cohesive2

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2.048(a)	4	.512	.582	.677
Intercept	.144	1	.144	.163	.687
@13	.142	1	.142	.161	.689
Bonus	.274	1	.274	.312	.578
Technology	.041	1	.041	.047	.829
Bonus * Technology	1.509	1	1.509	1.715	.194
Error	73.036	83	.880		
Total	75.083	88			
Corrected Total	75.083	87			

a R Squared = .027 (Adjusted R Squared = -.020)

**TABLE 4**  
**Univariate Analysis of Variance**  
**Dependent Variable-Sociometric Structure**

**Panel A**

**Between-Subjects Factors**

		Value Label	N
Bonus	0		48
	1		41
Technology	1	Go to Meeting	46
	2	Blackboard	43

**Panel B**

**Tests of Between-Subjects Effects**

Dependent Variable: ZFactorRC938\_939\_940

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	14.222 <sup>a</sup>	4	3.555	6.562	.000
Intercept	6.790	1	6.790	12.532	.001
@13	7.301	1	7.301	13.474	.000
Bonus	6.076	1	6.076	11.214	.001
Technology	1.625	1	1.625	2.999	.087
Bonus * Technology	.490	1	.490	.904	.344
Error	45.515	84	.542		
Total	59.737	89			
Corrected Total	59.737	88			

a. R Squared = .238 (Adjusted R Squared = .202)

**APPENDIX A  
EXPERIMENTAL MATERIALS**

**Questionnaire  
RESEARCHER VERSION**

Part I. Please tell us about yourself and your experience.

1. Your age

- 21-25
- 26-30
- 31-35
- 36-40
- 41-45
- 46-50
- 51-55
- 56-60
- over 60

2. Number of years of full-time work experience

- 0
- 1-3
- More than 3

3. Your gender

- M
- F

4. Highest level of formal education achieved

- Bachelor's degree (accounting major)
- Bachelors degree-Other than accounting (specify ) \_\_\_\_\_
- Master's degree (specify type) \_\_\_\_\_
- Doctorate (specify type) \_\_\_\_\_

5. Number of people in your team

- 4
- 5
- Other. Please specify: \_\_\_\_\_  
\_\_\_\_\_

6. What was your undergraduate overall GPA? \_\_\_\_\_

7. How comfortable do you feel using computer technology?

\_\_\_\_\_

1	2	3	4	5
Very Comfortable		Neutral		Very Uncomfortable

Part II. Please complete the below questions regarding your team's interaction so far to the best of your ability

**Interaction Quality (Andres 2002, as adapted from Green and Taber (1980))**  
*(Reverse Scored)*

When working on this project, to what extent did you:

1. Feel frustrated or tense about the other team members' behavior  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_
  
2. Express negative opinions about any project team member's behavior  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_
  
3. Observe others express a negative opinion about your behavior  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

---

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

\*\*\*\*\*

**Group Process Satisfaction (Andres 2002, as adapted from Green and Taber (1980))**  
*(Reverse Scored)*

How would you describe your team process?

4. Refer to the scale below and write your numerical answer here: \_\_\_\_\_

---

1	2	3	4	5
Fair		Neither fair nor unfair		Unfair

5. Refer to the scale below and write your numerical answer here: \_\_\_\_\_

---

1	2	3	4	5
Confusing		Neither confusing nor understandable		Understandable

6. Refer to the scale below and write your numerical answer here: \_\_\_\_\_

---

1	2	3	4	5
Satisfying		Neither satisfying nor unsatisfying		Unsatisfying

7. Refer to the scale below and write your numerical answer here: \_\_\_\_\_

---

1	2	3	4	5
Efficient		Neither efficient nor Inefficient		Inefficient

8. Refer to the scale below and write your numerical answer here: \_\_\_\_\_

---

1	2	3	4	5
Coordinated		Neither coordinated nor Uncoordinated		Uncoordinated

\*\*\*\*\*

**Team Collectivist Orientation (Andres 2006, as adapted from Green and Taber (1980))**

*(Reverse Scored)*

To what extent did:

9. One or two members dominate the discussion more than they should?  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

10. Members remain stubborn in their viewpoints?  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

11. Members with good ideas not seem to speak up?  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

12. Members seem to work as a team?  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_



\*\*\*\*\*

**Team Cohesion (Huang, et al. 2003, adapted (or possibly whole instrument was used) from Seashore 1954)**  
*(Reverse Scored)*

13. Do you feel that you are really part of your student work team? (Check one answer)

- Really a part of my work team.
- Included in most ways.
- Included in some ways, but not in others.
- Don't feel I really belong too much.
- Don't feel I really belong at all.

14. If you had a chance to do the same kind of work in another student work team, how would you feel about moving to another team? (Check one answer)

- Would want very much to stay where I am.
- Would rather stay where I am than move.
- Would make no difference to me.
- Would rather move than stay where I am.
- Would want very much to move.

How does your work team compare with other student teams on each of the following points?

15. The way people get along together.  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

16. The way people work together.  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

17. The way people help each other.  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

---

1	2	3	4	5
Very much better		About the same		Very much worse

\*\*\*\*\*

### Perceptions of Process

18. Were team members well committed to the goals and objectives of the team?

Refer to the scale below and write your numerical answer here: \_\_\_\_\_

19. To what extent was trust exhibited within the team?

Refer to the scale below and write your numerical answer here: \_\_\_\_\_

20. Did team members recognize and respect individual differences and contributions?

Refer to the scale below and write your numerical answer here: \_\_\_\_\_

21. Were team members open and frank in expressing their ideas and feelings?

Refer to the scale below and write your numerical answer here: \_\_\_\_\_

---

1	2	3	4	5	6	7
To a Little Extent			To some extent			To a very great extent

\*\*\*\*\*

**Team Commitment (Huang et al 2003, adapted from Larson and LaFasto 1989)  
(Reverse Scored)**

22. Achieving our team goal(s) is a higher priority than any individual objective.  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

23. Team members believe that personal success is achieved through the  
accomplishment of the team goal(s).  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

24. Team members are willing to devote whatever effort is necessary to achieve team  
success.  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

\*\*\*\*\*

**Collaborative Climate ((Huang et al 2003, adapted from Larson and LaFasto 1989)**

25. We trust each other sufficiently to accurately share information, perceptions and feedback.

Refer to the scale below and write your numerical answer here: \_\_\_\_\_

26. We help each other by compensating for individual shortcomings.

Refer to the scale below and write your numerical answer here: \_\_\_\_\_

27. We can trust each other to act competently and responsibly in performing our individual tasks.

Refer to the scale below and write your numerical answer here: \_\_\_\_\_

28. As a team we embrace a common set of guiding values.

Refer to the scale below and write your numerical answer here: \_\_\_\_\_

\_\_\_\_\_

1	2	3	4
False			True



\*\*\*\*\*

**Team Goal (Huang, from Larson and LaFasto 1989)**

32. There are clearly defined and shared needs among all members (the goals to be achieved or purposes to be served) which justifies the existence of our team.  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

33. Our clearly defined and shared purposes are noble and worthwhile.  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

34. Our clearly defined and shared goals represent an opportunity for an exceptional level of achievement.  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

35. Our clearly defined and shared goals challenge individual limits and abilities.  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

36. There are clear consequences connected with our team's success or failure in achieving our clearly defined and shared goals.  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

37. Our clearly defined and shared goals are compelling enough that I can derive a worthwhile sense of identity from them.  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

\_\_\_\_\_

1	2	3	4
False			True

\*\*\*\*\*

**Informal Leadership (Adapted from Green and Taber 1980, 102)**

*(Reverse Scored)*

38. To what extent did you feel one person influenced the final solution more than the rest of the group?

---

1	2	3	4	5	6	7
To a Little Extent			To some extent			To a very great extent



**Part X. Please complete the below questions regarding your team's work process.**

***(Post-Experimental Manipulation Checks)***

41. Approximately how much time did you individually spend on each of the three projects?

Project #1 \_\_\_\_\_  
Project #2 \_\_\_\_\_  
Project #3 \_\_\_\_\_

42. Did you use the telephone to discuss any of the three projects with a team member?

Yes. Explain \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
 No

43. Did you use Go to Meeting software to conduct team meetings?

Yes.  
 No (Go to question #45)

44. If you used Go to Meeting software, how satisfied were you with the product?  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

\_\_\_\_\_

1	2	3	4	5
Satisfied		Neutral		Unsatisfied

45. To what extent did the Go to Meeting software help your team bond as a team?  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

\_\_\_\_\_

1	2	3	4	5	6	7
To a Little Extent			To some extent			To a very great extent

46. Did you use Blackboard to conduct team meetings?

- Yes.  
 No (Go to question #49)

47. If you used Blackboard, how satisfied were you with the product?  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

\_\_\_\_\_

1	2	3	4	5
Satisfied		Neutral		Unsatisfied

48. To what extent did the Blackboard software help your team bond as a team?  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

\_\_\_\_\_

1	2	3	4	5	6	7
To a Little Extent			To some extent			To a very great extent

49. What effect did the peer-determined bonus points have on your individual effort?  
Refer to the scale below and write your numerical answer here: \_\_\_\_\_

***ONLY FOR BONUS TREATMENT GROUP (n~44)***

\_\_\_\_\_

1	2	3	4	5	6	7
To a Little Extent			To some extent			To a very great extent